

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-104459

(43)Date of publication of application : 21.04.1995

(51)Int.Cl.

G03F 1/08
H01L 21/027

(21)Application number : 05-252016

(71)Applicant : FUJITSU LTD

(22)Date of filing : 08.10.1993

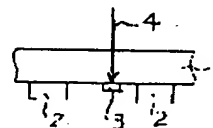
(72)Inventor : IBARAKI TOSHIAKI
DOI KAZUMASA

(54) DEFECT CORRECTION METHOD AND DEVICE FOR PHOTOMASK

(57)Abstract:

PURPOSE: To eliminate a trouble generated due to a splash at the time of correcting a black defect, regarding the correction of a photomask defect.

CONSTITUTION: A photomask is held with the side having a shade film 2 kept down, and a laser beam 4 is radiated from the upper side of the photomask via the transparent substrate 1 thereof. The etching residue (black defect) of the film 2 generated at the time of patterning is thereby splashed and removed. Preferably, the photomask is held on a stage having a levelling function, and the residue 3 is drawn from the lower side of the photomask via an exhaust mechanism.



DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention is the black defect of the photo mask used for a lithography process. (etch residue of the shading film in the case of patterning of a shading film) It is related with correction.

[0002] In manufacture of a semiconductor device, the photo mask of several ten sheets is used for manufacturing one device. It is very difficult to manufacture the photo mask produced in large quantities as a 100 % excellent article on the basis of severe quality control. To the sake Few defects of a photo mask are used being corrected.

[0003]

[Description of the Prior Art] Former, In order to remove the black defect of a photo mask The laser beam was irradiated at the portion, the black defect was dispersed, and it has removed.,

[0004] Drawing 3 (A) and (B) It is a cross section explaining the conventional example. drawing -- setting -- 1 -- transparent substrate of a photo mask 2 -- shading film of a photo mask 3 -- black defect 4 is a laser beam.

[0005] In this case Shading film The field in which 2 was formed is turned up, a photo mask is placed, and it is a black defect from the upper part. The laser beam was directly irradiated to 3. For this reason, the shading film residue blown away at once by the laser beam Natural fall will be carried out near the correction section with gravity, and the reattachment will be carried out on a photo mask. the punctate shading film which dispersed and carried out the reattachment -- a splash (splash) -- it is referred to as 3S

[0006] For this reason, poor correction and a highly precise revision were difficult, and the effect of correction of the photo mask by laser radiation had decreased. Moreover, since the shading film residue which carried out the reattachment adheres on both a white pattern (transparent substrate of a photo mask), and a black pattern (shading film pattern), it is quite difficult again to correct this. Furthermore, the adhesion force to the transparent substrate of the shading film residue which carried out the reattachment is equivalent to the shading film currently formed normally.

[0007]

[Problem(s) to be Solved by the Invention] this invention aims at removing the obstacle by the splash in the case of correction of a black defect.

[0008]

[Means for Solving the Problem] Solution of the above-mentioned technical problem is 1 shading film. The field where 2 was put is turned down and a photo mask is held. Transparent substrate of the top to a photo mask It lets 1 pass and is a laser beam. By irradiating 4 Dirty residue 3 of this shading film generated on the occasion of patterning of this shading film (black defect) The defective correction method of the photo mask which is dispersed and is removed, or the 2 aforementioned photo mask is held on the stage which has a leveling function. from this photo-mask bottom according to an exhaust air mechanism The drawing-in defective correction method of the photo mask one aforementioned publication, Or 3 shading films Stage which turns down the field where 2 was put and holds the periphery section of a photo mask 9, Transparent substrate of this stage top to a photo mask It lets 1 pass and is a laser beam. 4 is irradiated. etch residue (black defect) 3 of this shading film defective correction equipment of the photo mask which has the laser light source which is dispersed and can be removed or the 4 aforementioned stage -- leveling function 8 is equipped and it is attained by the defective correction equipment of the photo mask of three aforementioned publication which has the exhaust air mechanism 11 which can be attracted from the aforementioned photo-mask bottom.

[0009]

[Function] In this invention, the field where the shading film was put is turned down, and a photo mask is placed. A laser beam is irradiated through the transparent substrate of a photo mask from the bottom. Black defect (shading film residue) It is made to disperse. Therefore, in order to carry

out natural fall of the shading film residue which dispersed, the reattachment of it is not carried out on a photo mask.

[0010]

[Example] Drawing 1 is a cross section explaining the example of this invention. drawing -- setting -- transparent substrate which 1 becomes from quartz glass etc. Shading film with which 2 consists of a chromium (Cr) film etc. 3 -- black defect 4 is a laser beam.

[0011] Transparent substrate of a photo mask 1 is a shading film. 2 is held downward and it is a laser beam. For example, YAG Laser [SHG (the 2nd higher harmonic), output 3.5 mJ, wavelength 0.53 μm] is used. Transparent substrate It lets 1 pass and is a black defect. 3 irradiates.

[0012] Drawing 2 (A) - (C) It is explanatory drawing of the equipment used for the example. drawing -- setting -- 5 and 6 -- the presser foot of a photo mask, and 7 It is the lock of working. A photo mask is held downward in a shading film surface by these members.

[0013] 8 is a light sensitive cell for leveling of a photo mask, and is drawing 2 (B). Three places cannot be found in the circumference of a photo mask like, and four places are arranged. Leveling irradiates a laser beam at a photo mask, and is a light sensitive cell about the scattered light. It is carried out by detecting by 8. leveling of the photo mask is carried out correctly A correction part carries out position appearance, and irradiation of a laser beam is performed correctly.

[0014] 9 is an X-Y stage and measures a position correctly with a laser interferometer 10. A photo mask is moved to a correction part. Here, from the photo-mask bottom, a laser beam is irradiated and a black defect is dispersed.

[0015] At this time Drawing 2 (C) Like, from the photo-mask bottom, it exhausts from the suction mouth 11 and the shading film residue which dispersed is attracted. This exhaust air mechanism, It enables it to remove depending on correction environment or correction conditions.

[0016] It is such. With the equipment which has a photo-mask modify feature by the stage and laser beam which have a leveling function, the correction yield improves conventionally and it becomes correctable [a high precision pattern] by adding a leveling function further.

Consequently, it can contribute also to shortening of a device development cycle.

[0017]

[Effect of the Invention] According to this invention The obstacle by the splash in the case of correction of a black defect is removable. The correction yield improves. It was able to contribute to shortening of the manufacture move of a photo mask. This result, Upgrading of a photo mask can be planned and it is a pan. It was able to contribute also to simplification of the inspection process of a photo mask.

[Translation done.]

CLAIMS

[Claim(s)]

[Claim 1] Shading film (2) The put field is turned down and a photo mask is held. Transparent substrate of the top to a photo mask (1) It lets it pass and a laser beam (4) is irradiated, The defective correction method of the photo mask characterized by dispersing the etch residue (black defect) (3) of this shading film generated on the occasion of patterning of this shading film, and removing.

[Claim 2] The defective correction method of the photo mask according to claim 1 characterized by holding the aforementioned photo mask on the stage which has a leveling function, and attracting it according to an exhaust air mechanism from this photo-mask bottom.

[Claim 3] Shading film (2) Stage which turns the put field down and holds the periphery section of a photo mask (9) Transparent substrate of this stage top to a photo mask (1) It lets it pass and is a laser beam. Defective correction equipment of the photo mask characterized by having the laser light source which (4) is irradiated, and the etch residue (black defect) (3) of this shading film is dispersed, and can be removed.

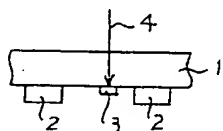
[Claim 4] It is a leveling function (8) to the aforementioned stage. Defective correction equipment of the photo mask according to claim 3 characterized by having the exhaust air mechanism (11) which is equipped and can be attracted from the aforementioned photo-mask bottom.

[Translation done.]

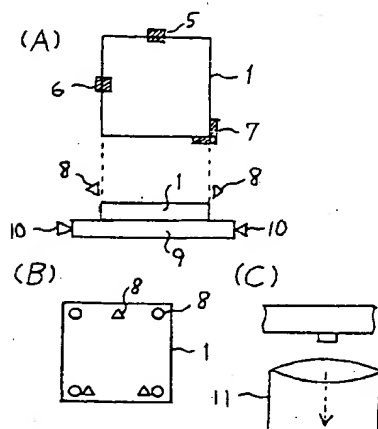
DRAWINGS

[Drawing 1]

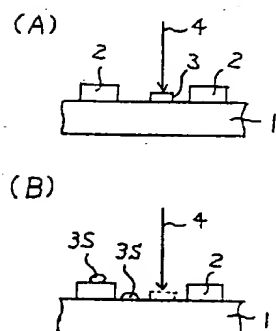
本発明の実施例を説明する断面図

[Drawing 2]

実施例に使用した装置の説明図

[Drawing 3]

従来例を説明する断面図



[Translation done.]

